

## **PALLET**

### **FIELD OF THE INVENTION**

[0001] The invention is directed generally to pallets, and more particularly, to cargo pallets having cavities for receiving forklift tines.

### **BACKGROUND**

[0002] Wood pallets are used to transport and store a variety of different kinds of cargo. Conventional wood pallets are formed from a top support member and a bottom support member separated by a plurality of cavities sized to receive forklift tines. The top and bottom support members are separated by a plurality of wooden support blocks, which are positioned to form the plurality of cavities. The top and bottom support members are often formed from a plurality of 1 inch by 4 inch lumber, and the support blocks are often formed from 2 inch by 4 inch lumber or 4 inch by 4 inch lumber.

[0003] During use, forklift tines are inserted into the cavities to lift the pallets. Often times, the tines of these devices are not inserted into the cavities in the correct location beneath the top support members. Rather, the tines first strike the support members, which either destroys the pallet or damages the support members. Pallets that are destroyed must be replaced, which often delays delivery schedules and increases costs. A damaged pallet is weakened and often requires replacement before expiration of a normal lifespan of the pallet. Thus, a pallet having support blocks capable of withstanding blows from forklift tines is needed.

## SUMMARY OF THE INVENTION

This invention is directed to a pallet formed from one or more top support members adapted to support cargo and having at least one substantially flat top surface and a bottom surface. The top support member is supported by two or more support blocks, which may be coupled to the bottom surface of the at least one top support member for positioning the top surface of the pallet above a surface, to allow a lifting member to be placed underneath the top support member for moving the pallet. The support blocks may have a top surface, a bottom surface, and a side surface and may be spaced apart a sufficient distance to form one or more cavities for receiving a lifting member. The lifting member may be, but is not limited to, tines for a forklift, a pallet jack, a reach truck, or other similar device. The support blocks may have a side surface forming a generally oval cross-section, which may guide lifting members into the cavities beneath the top support member. The cross-section may be formed from a single curved line, two or more curved or straight lines, or a combination of curved and straight lines. The cross-section of the support block may have a first end and a second end along a longitudinal axis of the support block. The support blocks may be aligned so that the first end is positioned proximate to a side surface of the top support member and the longitudinal axis of the support block is aligned so that the first end of the support device guides a lifting member into a lifting position under the top support member.

[0004] The support blocks may be formed from a composite material. In at least one embodiment, the composite material may be a combination of a cellular material and at least one thermoplastic resin. The cellular material may be, but is not limited to, a wood species, linen flax shives, bagasse from sugar cane, jute, and bamboo. The thermoplastic

resin may be a polypropylene, a polyethylene, or other appropriate thermoplastic resin, or any combination thereof. The composite material may provide increased strength to the support blocks in comparison with support blocks formed from 100 percent wood. The composite material may provide increased wear resistance and, therefore, increased lifespan. The composite material is superior to an all plastic material in that the composite material is nailable, easily machinable, easier to paint, and lighter.

**[0005]** In at least one embodiment, the pallet may be formed from a top support member formed from three cross supports coupled to a plate. Nine or more support blocks may be formed into at least three rows beneath the top support member and positioned generally parallel to each other forming at least two cavities to receive one or more lifting members. A bottom support member may be coupled to a bottom surface of the support blocks to provide a stable surface upon which the pallet rests.

**[0006]** An advantage of some embodiments of this invention is that the exterior shape of the support blocks form a guide for positioning the lifting members under the top support member of the pallet. Thus, loading a pallet of this invention requires less time to load because time is not lost in aligning the lifting member with the cavities beneath the top support member.

**[0007]** Another advantage of some embodiments of this invention is that the exterior shape and hard, low friction surface tends to deflect blows received from lifting members striking the support blocks rather than absorbing the forces delivered by the lifting members without redirecting the lifting members. This, in effect, limits damage to products supported by the pallet. In contrast, a hollow plastic block often dents and cups the point of a lifting member upon being struck.

[0008] Yet another advantage of some embodiments of this invention is that the composite material increases the strength and durability of the support blocks, thereby increasing the lifespan of the pallet.

[0009] These and other features and advantages of the present invention will become apparent after review of the following drawings and detailed description of the disclosed embodiments.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0010] The accompanying drawings illustrate embodiments of this invention and, together with the description, disclose various aspects of the invention. These figures include the following:

[0011] Figure 1 is perspective view of a pallet according to one or more aspects of this invention;

[0012] Figure 2 is a side view of a support block of this invention;

[0013] Figure 3 is a top view of a support block of this invention;

[0014] Figure 4 is a top view of a support block having an alternatively shaped cross-section;

[0015] Figure 5 is a top view of a support block have another alternatively shaped cross-section;

[0016] Figure 6 is a top view of a support block having yet another alternatively shaped cross-section;

[0017] Figure 7 is a top view of a support block having still another alternatively shaped cross-section;

[0018] Figure 8 is a top view of a support block having another alternatively shaped cross-section;

[0019] Figure 9 is a top view of a support block having yet another alternatively shaped cross-section; and

[0020] Figure 10 is a top view of a support block having still another alternatively shaped cross-section.

### **DETAILED DESCRIPTION**

[0021] Figures 1-10 illustrate a pallet 10, and related components thereof, configured to support cargo on one or more top support members 12. The top support member 12 is supported above a surface 14 using two or more support blocks 16 positioned to allow lifting members 18 to be placed under the top support member 12 to lift the pallet 10 and the cargo supported by the pallet 10. The top support member 12 may have any suitable shape. In at least one embodiment, as shown in Figure 1, the top support member 12 may be composed of a generally flat top surface 20 and a bottom surface 22. In other embodiments, top support member 12 may have top surfaces 20 that are not flat. In some embodiments, the top surface 20 may include one or more coatings or other textured materials to prevent cargo from slipping or moving on the top surface 20. In at least one embodiment, as shown in Figure 1, the top support member 12 may be formed from three cross supports 24 positioned generally parallel to each other and a plate 26 coupled to a top surface 20 of the three cross supports 24 forming the top surface 20.

[0022] The support blocks 16 may be positioned so that a lifting member 18 may be positioned between the surface 14 and the bottom surface 22 to lift the pallet 10 in a stable

manner. The lifting member 18 may be, but is not limited to: one or more tines of a forklift, pallet jack, reach truck, or other lifting device; one or more cables, or other devices having appropriate strength. In at least one embodiment, the support blocks 16 may have a height between about 3 inches and about 6 inches. A top surface 28 of the support block 16, as shown in Figure 3, may be configured to be attached to the bottom surface 22 of the top support member 12. The support block 16 may have a bottom surface 30, as shown in Figure 2, configured to rest on the surface 14 and provide the pallet 10 with a stable support surface. In at least one embodiment, the bottom surface of the support block 16 may be coupled to a bottom support member 32 configured to rest stably on the surface 14. The support block 16 may be configured to guide lifting members 18 into position under the top support member 12, as shown in Figure 1.

**[0023]** The support block 16 may have an oval cross-section, which shall be defined herein to include elliptical shapes as shown in Figure 4, teardrop shapes as shown in Figure 7, and egg shapes as shown in Figure 8, as well as other suitable curvilinear shapes as shown in Figure 5, and other elongated shapes having linear and/or curvilinear sides such as an elongated hexagon as shown in Figure 6, a diamond shape as shown in Figure 9, and a kite shape as shown in Figure 10 in which one end has a more gradual transition than the other end. Examples of suitable oval cross-sections are shown in Figures 3 and 4, where a first distance 42 is greater than a second distance 44. The oval cross-section may be formed from a single continuous line, as shown in Figures 3 and 4.

**[0024]** In other embodiments, the cross section of the support block 16 may be formed from a combination of curved lines and at least substantially straight lines, as shown in Figure 5. The embodiment shown in Figure 5 may have a first substantially flat surface

forming the first end 34 and a second substantially flat surface forming the second end 36. This embodiment may also have a third substantially flat surface 41 positioned on a side surface 39 of the support block 16 between the first and second ends 34, 36, and a fourth substantially flat side 43 on a side surface 39 of the support block 16 between the first and second ends 34, 36 and opposite to the third substantially flat surface 41, as well as rounded surfaces 35.

[0025] In other embodiments, the cross section of the support block 16 may be formed from a plurality of substantially straight lines, as shown in Figure 6, which may form a hexagon having six sides or another shape having multiple sides.

[0026] The support block 16 may have a first end 34 and a second end 36 positioned along a longitudinal axis 38. The longitudinal axis 38 may be positioned between the first end 34 and the second end 36. The first end 34 may be positioned proximate to a side surface 40 of the top support member 12, as shown in Figure 1. The longitudinal axis 38 may be aligned relative to the top support member 12 so that the first end 34 guides a lifting member 18 into position under the top support member 12. In at least one embodiment, the longitudinal axis 38 may be generally parallel to a side surface 40 the top support member 12. By configuring the first distance 42 of the support block 16 to be longer than the second distance 44, the support block 16 is able to redirect misaligned lifting members 18 into a cavity 46 under the top support member 12.

[0027] The support block 16 may be formed from a composite material. In at least one embodiment, the composite material may be formed from at least one species of a cellular material and a thermoplastic resin, or a combination of a cellular material and a thermosetting resin, or any combination thereof. The cellular material may be, but is not

limited to, a wood species, linen flax shives, bagasse from sugar cane, jute, rice husks, paper fiber, recycled paper, nut shells, cornhusks, other agricultural products, and bamboo. The composite material may have better impact strength and higher nail retention than wood. In particular, the composite material may have a fork tine compression strength that is about 2.5 times greater the fork tine compression strength of a wooden block made of standard southern yellow pine. For instance, the time compression strength of the composite material may be about 4,225 pounds at 23 degrees Celsius per composite block having dimensions of about 4.61 inches long, 3.77 inches wide, and 3.51 inches high. In addition, the nail retention strength may be about 50 percent better than the nail retention strength of standard southern yellow pine. The composite material may also be generally water resistant such that the composite material may not absorb more than five percent water by weight and has less than two percent enlargement in any direction when submerged in water at 20 degrees Celsius for 24 hours. In addition, in at least one embodiment, the composite material does not distort when placed in water at 100 degrees Celsius for one hour.

[0028] The concentration of wood species in the composite may be between about one percent and about 99 percent, and more preferably, between about 40 percent and about 60 percent, although the invention is not limited to these concentration ranges. The wood species may be in a wood flour form having particle sizes between about 0.1 millimeters (mm) and about 1.0 mm, although the invention is not limited to use of a wood flour or to a wood flour having a particle size falling within this range of particle sizes.

[0029] The cellular material may also be formed from particles having diameters between about 0.05 mm and about 4 mm, preferably between 0.1 mm and 1 mm, and most

preferably between about 0.177 mm to about 0.42 mm. The cellular material may be formed from wood particles having different diameters. Wood particles of these sizes can provide increased durability of the support block 16.

[0030] The thermoplastic resin may be a polyolefin, such as a polypropylene or a polyethylene, or other thermoplastic resin, or any combination thereof. The polyethylene may have a density between about 0.9 grams per cubic centimeter and about 0.98 grams per centimeter, although the invention is not limited to resins having densities in this range. More particularly, the polyethylene may be a linear low density polyethylene, an ultra low density polyethylene, a low density polyethylene, a high density polyethylene, or an ultra high molecular weight polyethylene, or any combination thereof.

[0031] The polypropylene may be formed from a homopolymer or a copolymer having a density between about 0.80 grams per cubic centimeter and about 0.99 grams per cubic centimeter, although the invention is not limited to resins having densities in this range. The thermosetting resin may be, but is not limited to, a polyester, an epoxy, or vinylester. Support blocks 16 formed from the composite material are capable of withstanding repeated blows from lifting members 18.

[0032] In at least one embodiment, the pallet 10 may have a plurality of support blocks 16 coupled to the bottom surface 22 of the top support member 12. There may be nine support blocks, as shown in Figure 1, wherein a first group of three support blocks 16 may be positioned in a first row 48, a second group of three support blocks may be positioned in a second row 50, and a third group of three support blocks may be positioned in a third row 52. The first, second, and third rows 48, 50, 52 of support blocks 16 may be positioned generally parallel to each other, such that the first, second, and third rows 48, 50, 52 of

support blocks 16 support the cross supports 24. Each row 48, 50, 52 may include two support blocks 16 positioned proximate to the side surface 40 of the top support member 12 and aligned so that the first end 34 of each support block 16 may guide a lifting member 18 into a lifting position under the at least one top support member 12.

**[0033]** The terms and expressions which have been employed herein are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof. Having thus described the invention in detail, it should be apparent that various modifications can be made in the present invention without departing from the spirit and scope of the following claims.